

IN THE CLAIMS:

Please cancel Claims 1-21 without prejudice or disclaimer of the subject matter recited therein.

Please add Claims 22-43 as follows.

22. (New) An optical information reproducing apparatus for recording or reproducing information by controlling rotation of an optical disk so as to provide a constant linear velocity by changing a rotation frequency in accordance with a radial-direction position of an optical spot, said apparatus comprising:

a circuit configured to control rotation of the optical disk by changing a rotation frequency thereof;

a focusing servo control circuit and a tracking servo control circuit for the optical spot; and

a circuit configured to adjust a servo-loop gain of tracking servo control in accordance with the change of the disk rotation frequency.

23. (New) An apparatus according to Claim 22, wherein said circuit configured to adjust the servo-loop gain of tracking servo control adjusts the servo-loop gain in accordance with a stationary rotation frequency at the radial-direction position of the optical spot.

24. (New) An apparatus according to Claim 22, wherein a recording region of the optical disk is divided into a plurality of zones in a radial direction, wherein said rotation control circuit controls rotation of the optical disk so that a linear velocity is substantially constant

between respective zones by changing the rotation frequency for each zone, and wherein said circuit configured to adjust the servo-loop gain of tracking servo control adjusts the servo-loop gain in accordance with a stationary rotation frequency of each zone.

25. (New) An apparatus according to Claim 22, wherein said circuit configured to adjust the servo-loop gain of tracking servo control adjusts the servo-loop gain by setting a gain proportional to eccentric acceleration corresponding to the change of the rotation frequency.

26. (New) An apparatus according to Claim 22, wherein said tracking servo control circuit is controlled by a sampling frequency that changes in accordance with the change of the rotation frequency, and wherein said circuit configured to adjust the servo-loop gain of tracking servo control performs gain adjustment in accordance with the change of the rotation frequency in a state in which a coefficient of a phase compensation filter included in said tracking servo control circuit is fixed.

27. (New) An apparatus according to Claim 22, wherein the optical disk is a sample servo disk having a servo region provided radially from the center of the optical disk, and wherein said circuit configured to adjust the servo-loop gain of the tracking servo control performs gain adjustment in accordance with the change of the rotation frequency in a state in which a coefficient of a phase compensation filter included in said tracking servo control circuit is fixed.

28. (New) An apparatus according to Claim 22, wherein said tracking servo control circuit is controlled with a constant sampling period in the entire region of the optical disk, and wherein said circuit configured to adjust the servo-loop gain of the tracking servo control adjusts the servo-loop gain by adjusting a coefficient of a phase compensation filter included in said tracking servo control circuit and a gain in accordance with the change of the rotation frequency.

29. (New) An apparatus according to Claim 22, wherein a recording region of the optical disk is divided into a plurality of zones, wherein said rotation control circuit controls rotation of the optical disk so that a linear velocity is substantially constant between respective zones by changing the rotation frequency for each zone, and makes zones among the plurality of zones, each having a rotation frequency within a predetermined rotation-frequency range a block, and wherein said circuit configured to adjust the servo-loop gain of the tracking servo control adjusts the servo-loop gain for each block.

30. (New) An apparatus according to Claim 22, wherein said circuit configured to adjust the servo-loop gain of tracking servo control adjusts the servo-loop gain so that when a servo gain at a highest rotation frequency W_{max} is represented by G_{max} , and a rotation frequency is represented by W_{curr} , a servo gain G_{curr} satisfies the following relationship:

$$G_{curr} = G_{max} \times W_{curr} / W_{max}.$$

31. (New) An apparatus according to Claim 22, wherein said focusing servo control circuit comprises a circuit configured to adjust the servo-loop gain of focusing servo control, and wherein when said circuit configured to adjust the servo-loop gain of tracking servo control changes the servo-loop gain of the tracking servo control with a predetermined ratio, said circuit configured to adjust the servo-loop gain of focusing servo control changes the servo-loop gain of focusing servo control with a ratio proportional to the root of the predetermined ratio.

32. (New) An apparatus according to Claim 22, wherein said circuit configured to adjust a servo-loop gain of tracking servo control adjusts the servo-loop gain of tracking servo control in accordance with the change of the disk rotation frequency so that the servo-loop gain in an outer portion of the optical disk is higher than that in an inner portion of the optical disk.

33. (New) An optical information reproducing apparatus for recording or reproducing information using an optical spot by controlling rotation of an optical disk so as to provide a constant linear velocity by changing a rotation frequency in accordance with a radial-direction position of the optical spot, said apparatus comprising:

a circuit configured to control rotation of the optical disk by changing a rotation frequency thereof;

a focusing servo control circuit and a tracking servo control circuit for the optical spot; and

a circuit configured to adjust a servo-loop gain of a focus servo control in accordance with the change of the disk rotation frequency.

33. (New) An apparatus according to Claim 33, wherein said circuit configured to adjust the servo-loop gain of the focusing servo control adjusts the servo-loop gain in accordance with a stationary rotation frequency at the radial-direction position of the optical spot.

34. (New) An apparatus according to Claim 33, wherein a recording region of the optical disk is divided into a plurality of zones in a radial direction, wherein said rotation control circuit controls rotation of the optical disk so that a linear velocity is substantially constant between respective zones by changing the rotation frequency for each zone, and wherein said circuit configured to adjust the servo-loop gain of the focusing servo control adjusts the servo-loop gain in accordance with a stationary rotation frequency of each zone.

35. (New) An apparatus according to Claim 33, wherein said circuit configured to adjust the servo-loop gain of focusing servo control adjusts the servo-loop gain by setting a gain proportional to eccentric acceleration corresponding to the change of the rotation frequency.

36. (New) An apparatus according to Claim 33, wherein said focusing servo control circuit is controlled by a sampling frequency that changes in accordance with the change of the rotation frequency, and wherein said circuit configured to adjust the servo-loop gain of the focusing servo control performs gain adjustment in accordance with the change of the rotation frequency in a state in which a coefficient of a phase compensation filter included in said focusing servo control circuit is fixed.

37. (New) An apparatus according to Claim 33, wherein said focusing servo control circuit is controlled with a constant sampling period in the entire region of the optical disk, and wherein said circuit configured to adjust the servo-loop gain of the focusing servo control adjusts the servo-loop gain by adjusting a coefficient of a phase compensation filter included in said focusing servo control circuit and a gain in accordance with the change of the rotation frequency.

38. (New) An apparatus according to Claim 33, wherein a recording region of the optical disk is divided into a plurality of zones, wherein said rotation control circuit controls rotation of the optical disk so that a linear velocity is substantially constant between respective zones by changing the rotation frequency for each zone, and makes zones among the plurality of zones, each having a rotation frequency within a predetermined rotation-frequency range a block, and wherein said circuit configured to adjust the servo-loop gain of the focusing servo control adjusts the servo-loop gain for each block.

39. (New) An apparatus according to Claim 33, wherein said circuit configured to adjust the servo-loop gain of focusing servo control adjusts the servo-loop gain so that when a servo gain at a highest rotation frequency W_{max} is represented by G_{max} , and a rotation frequency is represented by W_{curr} , a servo gain G_{curr} satisfies the following relationship:

$$G_{curr} = G_{max} \times \sqrt{W_{curr} / W_{max}}.$$

40. (New) An apparatus according to Claim 33, wherein said tracking servo control circuit comprises a circuit configured to adjust the servo-loop gain of tracking servo control, and wherein when said circuit configured to adjust the servo-loop gain of the focusing servo control changes the servo-loop gain of focusing servo control with a predetermined ratio, said circuit configured to adjust the servo-loop gain of tracking servo control changes the servo-loop gain of tracking servo control with a ratio proportional to the root of the predetermined ratio.

41. (New) An apparatus according to Claim 22, wherein said circuit configured to adjust the servo-loop gain of tracking servo control adjusts the servo-loop gain in accordance with a transient change of the rotation frequency caused by movement of the optical spot in a radial direction.

42. (New) An apparatus according to Claim 33, wherein said circuit configured to adjust the servo-loop gain of the focusing servo control adjusts the servo-loop gain in accordance with a transient change of the rotation frequency caused by movement of the optical spot in a radial direction.

43. (New) An apparatus according to Claim 22, wherein said circuit configured to adjust a servo-loop gain of focus servo control adjust the servo-loop gain of focus servo control in accordance with the change of the disk rotation frequency so that the servo-loop gain in an outer portion of the optical disk is higher than that in an inner portion of the optical disk.